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ICT –PROGRAMMING TOOL FOR CALCULATING MECHANICAL OR ENGINEERING MEASURES FOR SOIL EROSION CONTROL

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ABSTRACT

In the Information Communication Technology (ICT) era, present scenario where software programming tool is utilize everywhere .The agriculture is backbone Indian Agriculture .Agricultural field is not untouchable from ICT era .More specifically, e-Agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use information and communication technologies (IT) in the rural domain, with a primary focus on agriculture. Mechanical or Engineering methods depend upon manipulating the surface topography, for example, by installing terraces to control the flow of water. Mechanical measures are largely ineffective on their own because they cannot prevent detachment of soil particles. ICT–Programming Tool for Calculating Mechanical or Engineering Measures for Soil Erosion Control 'C' language programming a powerful tool for scientific community for Mechanical or Engineering Measures for Soil Erosion Control

This paper discuss the 'C' program to calculate Vertical interval, Horizontal interval, depth of cut in bench terracing, depth of water impounding before the bund, total bund height, Length of bund, Computation of flow velocity, Computation of catchment area of bund, Computation of peak runoff rate, Width of bench terrace, VI interval of bench terrace Area lost in contour bunding, length of bench terrace, Capacity of channel, Earthwork computation of bench terrace

***KEYWORDS:** ICT, E-Agriculture, Mechanical or Engineering, Vertical Interval, Horizontal Interval*

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Original Article

INTRODUCTION

In the Information Communication Technology (ICT) era, present scenario where software programming tool is utilize everywhere .The agriculture is backbone of this our country .Agricultural field is not untouchable from ICT era. E-Agriculture is an emerging field focusing on the enhancement of agricultural and rural development through improved information and communication processes. More specifically, e-Agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use information and communication technologies (IT) in the rural domain, with a primary focus on agriculture.

Indian Agriculture contributes to 18.6 per cent of India's GDP, and approximately 59 per cent Indians for Soil is most precious gift of nature - Prime resource - for food, fodder etc. Soils mismanage- less productivity. In India, more than 100 million hectares -soil degraded, eroded, and unproductive. About 17 tonnes/ha soil detached annually-20% of this is transported by river to sea, 10% deposited in reservoir results 1 to 2% loss off storage capacity. Soil erosion deteriorates soil quality & reduces productivity of natural agricultural, Soil erosion deteriorates

quality of water, and increased sedimentation causes reduction of carrying capacity of water.

Mechanical or Engineering methods depend upon manipulating the surface topography, for example, by installing terraces to control the flow of water. Mechanical measures are largely ineffective on their own because they cannot prevent detachment of soil particles. Their main role is in supplementing agronomic measures, being used to control the flow of any excess water that arises. Mechanical methods, including bunds, terraces, waterways, and structures such as vegetative barriers or stone lines installed on farm also can break the force of winds or decrease the velocity of runoff to reduce soil erosion.

Bunding is an engineering soil conservation measure used for retaining the water, creating obstruction, and thus controlling the soil erosion. ICT–Programming Tool for Calculating Mechanical or Engineering Measures for Soil Erosion Control ‘C’ language programming a powerful tool for scientific community for Mechanical or Engineering Measures for Soil Erosion Control

This paper discuss the ‘C’ program to calculate Vertical interval, Horizontal interval, depth of cut in bench terracing, depth of water impounding before the bund, total bund height, Length of bund, Computation of flow velocity, Computation of catchment area of bund Computation of peak runoff rate, Width of bench terrace, VI interval of bench terrace Area lost in contour bunding, length of bench terrace, Capacity of channel, Earthwork computation of bench terrace

MATERIALS AND METHODS

The methodology used to mechanical or engineering measures for soil erosion control. It includes different formulae and theoretical considerations. It also encapsulates the configuration of the system.

Configuration of the System

Desktop System , Intel® Pentium® 4, 2.0 GHz ,1 GB DDR 2-RAM, Intel 845 Series Motherboard , AGP card, Windows ™ XP Professional Windows Development

About the platform

For the different parameter of bund and terracing calculations using C language Version 3.0 Turbo c ++ copyright (c) 1990, 1992 by Borland International, Inc. following different formulae are used.

Different Parameter Calculation of Bunding and Terracing

Different Parameters of Bunding

- Vertical interval

  V.I = (((S/3) +2)*0.3)

  Horizontal interval H.I= (V.I/S)*100

- Depth of water impounding before the bund (h)

  $h=\sqrt{(VI * R)/500}$

  L= (10000/HI) Where, L= Length of bund (m) HI= Horizontal interval (m)

- Computation of flow velocity (V) $V= (R^{2/3}*S^{1/2})/n$ Where,

V=Flow velocity (m/s) S=Slope of field (%) R=Hydraulic radius (m)

A= HI*Length of bund

Computation of peak runoff rate by rational method (Q)

Q=CIA/360

- Area lost due to contour bunding (A_L)

A_L = (1.3*S*b)/VI

VI= Vertical interval between bund (m)

Different Parameters of Terracing

- Depth of cut in bench terracing

D= (W*S/100)

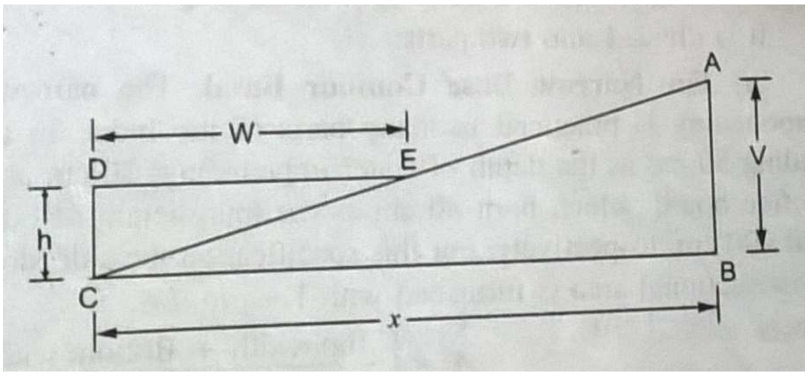


Figure 1: Basic Diagram for Bund

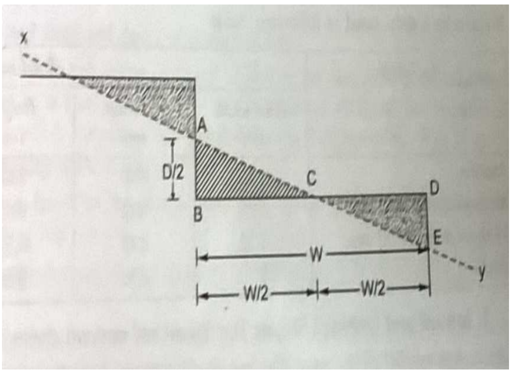


Figure 2: Width of Bench Terrace

C' Source Code for Parameter Calculations

```
// program developed by Dr P R Kolhe ,P P Kolhe at Dr BSKKV,Dapoli and Dr PDKV akola

#include <stdio.h>

#include<math.h>

#include<conio.h>
```

```
#define g 9.81
#define   tan45 1
void main()
{
float HI,VI,Al,b,S,L,w R,Q V,A,C,I, W,D,h,d,T,F, n,E,
int kk, choice = 0 ;
while (choice!=16)
{
printf("\n\t\t\t**** DEPARTMENT OF SWCE***\n");
printf("\t Mechanical or Engineering measures for soil erosion control \n\n");
printf("\t\t 1.Vertical interval VI=(0.3*((S/3)+2)) \n");
printf("\t\t 2.Horizontal interval HI=((VI/S)*100) \n");
printf("\t\t 3.depth of cut in bench terracing D=((W*S)/100) \n");
printf("\t\t 4.Depth of water impounding before the bund h=sqrt(VI*R)/50 \n");
printf("\t\t 5.Total bund height T=(h+d+F)\n");
printf("\t\t 6.Length of bund L=10000/HI\n");
printf("\t\t 7.Computation of flow velocity V=pow(R,0.66)*pow(S,0.5)/n \n");
printf("\t\t 8.Computation of catchment area of bund A=HI*L \n");
printf("\t\t 9.Computation of peak runoff rate Q=C*I*A/360 \n");
printf("\t\t 10.Width of bench terrace W=((200*D)/S)\n");
printf("\t\t 11.VI interval of bench terrace     VI=((W*S)/(100-S)); \n");
printf("\t\t 12.Area lost in contour bunding    Al=(1.3*S*b)/VI \n");
printf("\t\t 13.length of bench terrace L=((10000)/(W+VI)) \n");
printf("\t\t 14.Capacity of channel Q=(A*V) \n");
printf("\t\t 15.Earthwork computation of bench terrace E=(100*W*S)/8 \n");
printf("\n\t 16.EXIT \n");
printf("\n\t ENTER YOUR CHOICE <1 -16>");
scanf("%d",&choice);
{
```

```
case 1:  /* Vertical interval */
{
clrscr();
printf("\n\t\t **** 1.Vertical interval ***\n\ ");
scanf("%f",&S);
printf(" \n\t\t Output values for vertical interval==>\n");
VI=(0.3*((S/3)+2));
printf("\n\t\t the vertical interval V.I(m)=%5.2f",VI);/*For print press print key*/
getch(); clrscr(); break; }
case 2 :  /* Horizontal interval */
{
scanf("%f",&VI);
printf("\t\t\t Enter the value of slope(%)S=");
scanf("%f",&S);
printf("\n\t\tOutput values for horizontal interval==>\n");
HI=((VI/S)*100);
printf("\n\t\t the horizontal interval H.I(m)=%5.2f",HI);/*For print press print key*/ break;
}
case 3:   /* Depth of cut in bench terracing */
{
scanf("%f",&W);
D=((W*S)/100);
printf("\n\t\t Depth of cut in bench terrace D(m)=%5.2f",D);
/*For print press print key*/
getch();
break;
case 4:   /* Depth of water impounding before the bund(h) */
{
clrscr();
```

```
h=sqrt((VI*R)/50);
getch();
break;
}
case 5:   /* Total bund height */
{
scanf("%f",&F);
T=(h+d+F);
}
case 6:   /* Length of bund */
{
clrscr();
L=(10000/HI);
getch(); break;
}
case 7: /*Computation of flow velocity */
{
clrscr();
V=pow(R,0.66)*pow(S,0.5)/n;
getch(); break; }
case 8: /*computation of catchment area of bund */
{
A=HI*L;
getch();
break;
}
case 9: /*Peak runoff rate */
{
scanf("%f",& I);
```

```
scanf("%f",&A);

Q=C*I*A/360;

getch();

break;

}

case 10: /* Width of bench terrace */

 {

scanf("%f",&S);

printf("\n\tOutput values for width of bench terrace =\n");

W=((200*D)/S);

printf("\n\t\t width of bench terrace (m)=%5.2f",W);/*For print press print key*/

getch();

break;

}

case 11: /* Vertical interval of bench terrace */

{

scanf("%f",&W);

scanf("%f",&S);

printf("\n\tOutput values for VI of bench terrace=\n");

VI=((W*S)/(100-S));

 getch(); break; }

case 12: /* Area lost due to contour bunding */

{

clrscr();

scanf("%f",&b);  scanf("%f",&S);  scanf("%f",&VI);

Al=(1.3*S*b*100)/VI;

getch(); break; }

case 13: /*Length of bench terrace */

{ clrscr();
```

```
scanf("%f",&W);            scanf("%f",&VI);
L=((10000)/(W+VI));
getch(); break; }
case 14: /*Capacity of channel*/
{ clrscr();          printf("\n\n\t\t*** 14.Capacity of channel***\n");
scanf("%f",&V);
Q=(A*V);
break; }
case 15: /* Earthwork computation for bench terrace */
{
scanf("%f",&W);            scanf("%f",&S);
E=(100*W*S)/8;
getch();
break; }}}} //end
```

RESULTS AND DISCUSSIONS

With the guideline to use the different parameters calculator for mechanical measures for soil erosion control the programme is prepared in the C language Version 3.0 Turbo c ++. The details of the different parameters calculator for mechanical measures for soil erosion control are shown in the main page.

Output Screen of "C" Program

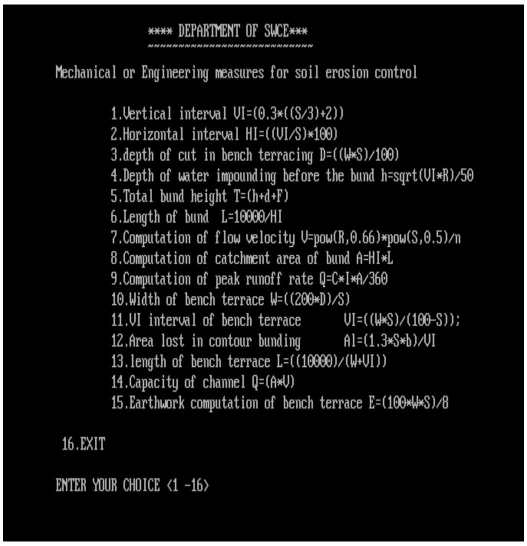


Figure 3

Main page: Option Window

Programme Output for Vertical Interval

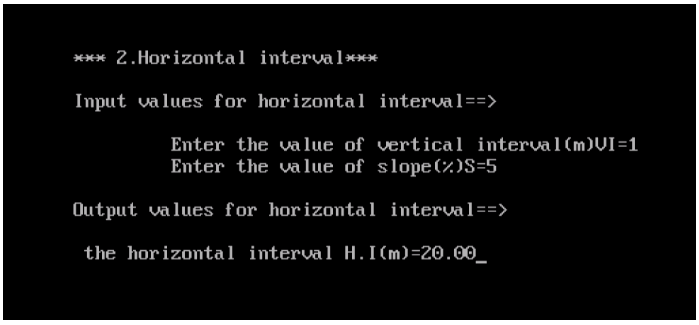


Figure 4

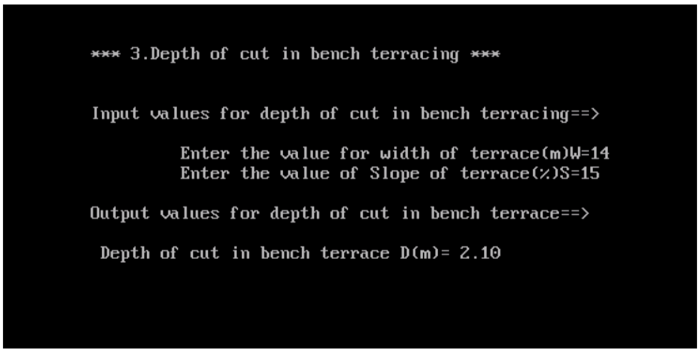


Figure 5

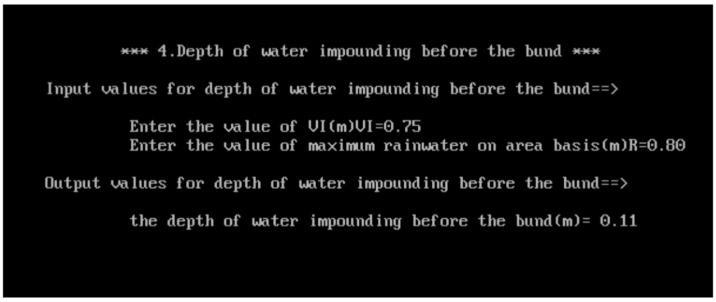
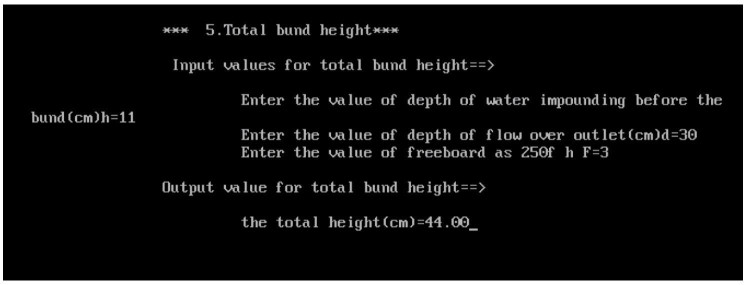


Figure 6



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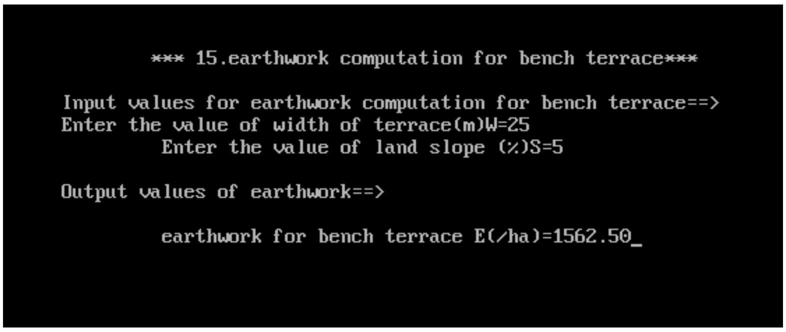

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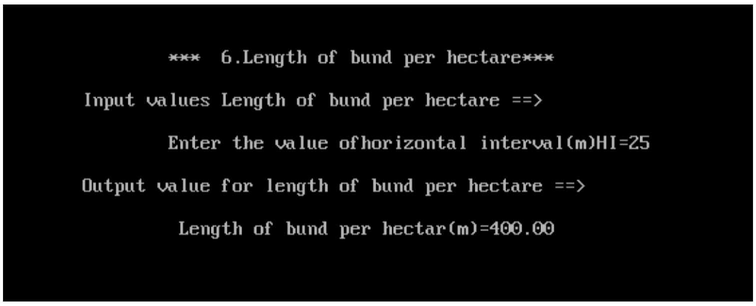

Figure 9

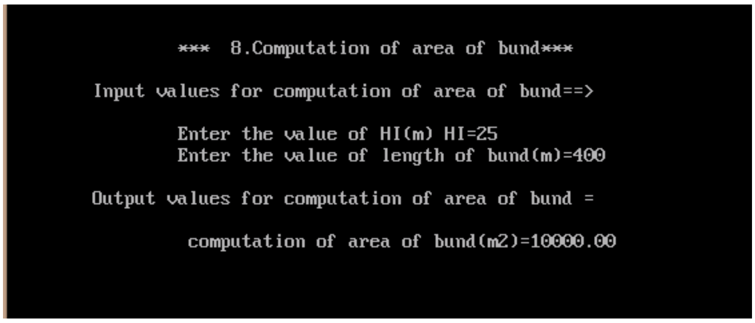

Figure 10

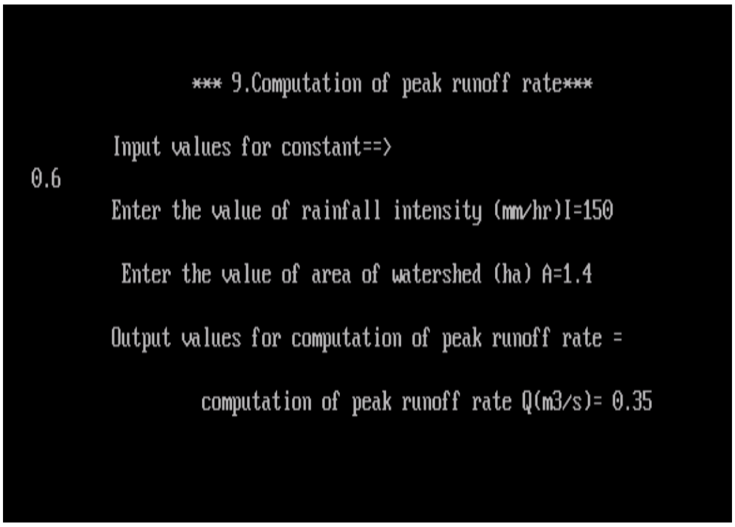

Figure 11

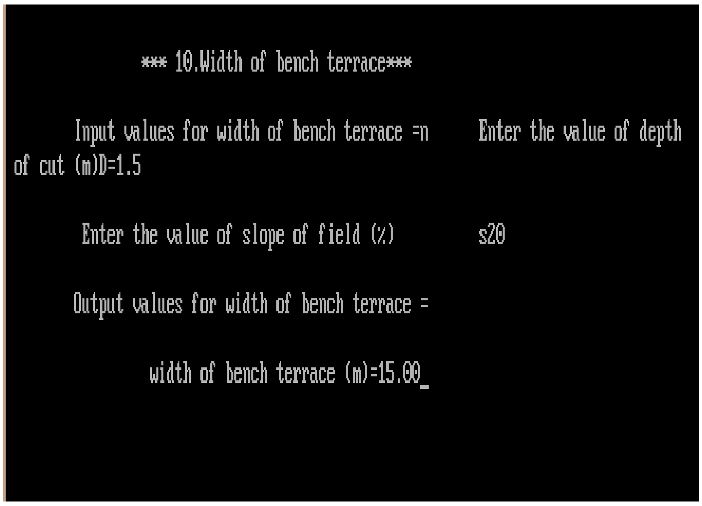

Figure 12

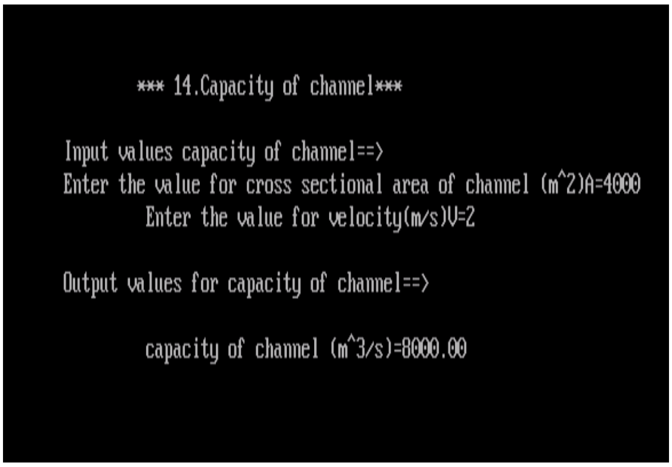

Figure 13

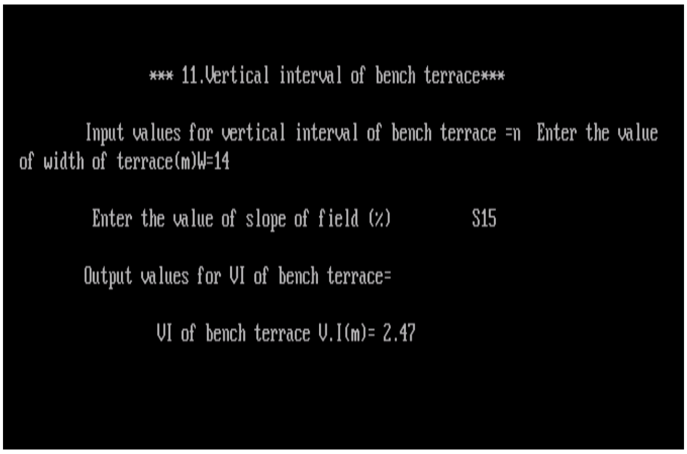

Figure 14

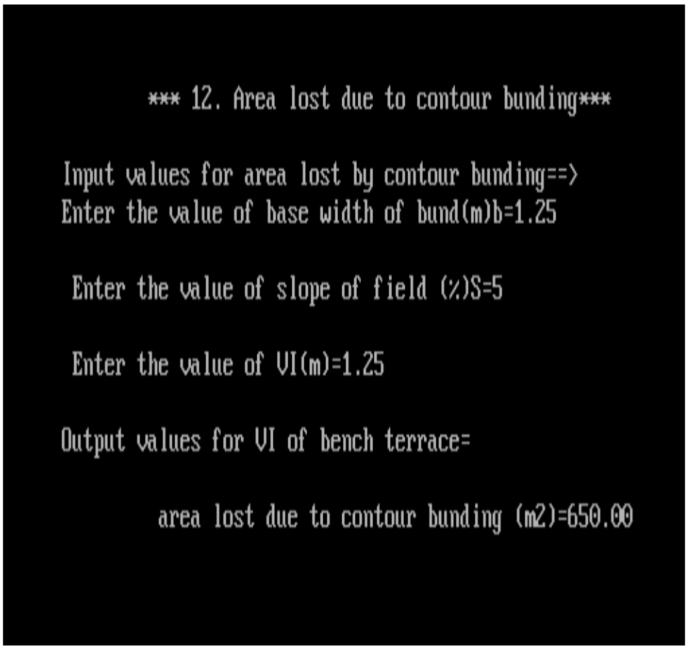

Figure 15

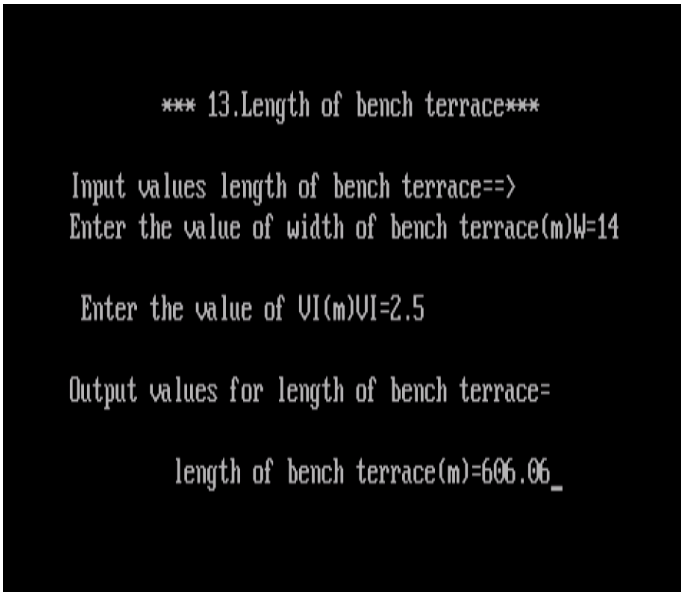

Figure 16

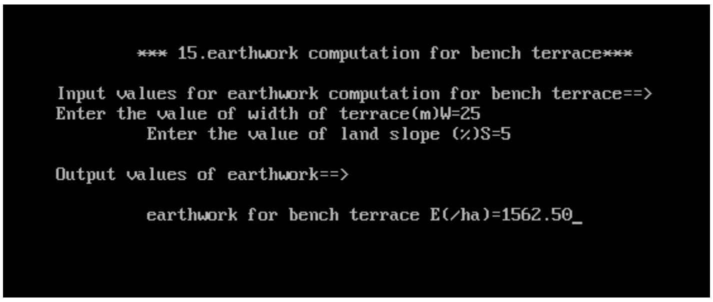

Figure 17

CONCLUSIONS

This program is useful for calculating the Mechanical measures for soil erosion control i. e. bunding and terracing are good practices for controlling the soil erosion.

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